

WHAT IS CLAIMED IS

1. A programmable device configured to calculate a diagonal interleaved  
5 parity word for a packet formed from a sequence of data words and ending in a  
control word, wherein the programmable device is configured to sequentially  
process the packet a predetermined number of words at a time, the programmable  
device comprising:  
a plurality of programmable blocks, one or more of the programmable  
10 blocks being configured to implement a set of XOR calculation chains, the one or  
more programmable blocks being configured such that the XOR calculation chains  
have the same length regardless of the number of data words in the packet.
2. The programmable device of claim 1, wherein each programmable block is  
15 a look-up-table-based programmable block.
3. The programmable device of claim 1, wherein each programmable block is  
an AND-array-based programmable block.
- 20 4. The programmable device of claim 1, wherein the data words and the  
control words correspond to sequential samples of an external bus supporting a  
wire-line-level protocol.
5. The programmable device of claim 4, wherein the wire-line-level protocol  
25 is SPI4-2.

6. The programmable device of claim 1, wherein each data word and the control word of the external bus is sixteen-bits wide.

5 7. A method of calculating a diagonal interleaved parity (DIP) word from a packet formed from a succession of data words ordered from a first data word to a last data word, the packet ending in a control word, the method comprising:  
successively sampling a predetermined number of ordered words from the packet, wherein the first sample starts at the first data word;  
10 for each successive sample of words, determining whether the control word is included in the sample:  
if the control word is not included in the sample of words,  
propagating a set of diagonal XOR calculation chains through the sample; and  
if the control word is included in the sample of words, assigning the  
15 words following the control word in the sample to logical zeroes and then  
propagating the set of diagonal XOR calculation chains through the sample of words to provide an intermediate DIP parity word.

8. The method of claim 7, further comprising adjusting the intermediate DIP  
20 parity word according to the number of words that were assigned values of logical zeroes to provide the DIP word.

9. The method of claim 8, wherein the bus is a SPI4-2 bus, each word is sixteen bits wide, and the set of diagonal XOR calculation chain comprises sixteen  
25 XOR calculation chains.

10. The method of claim 9, wherein the adjustment of the intermediate DIP parity word comprises shifting the bits of the intermediate DIP parity word to the left one bit for each word that was assigned values of logical zeroes.

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11. The method of claim 9, wherein the DIP parity word is a sixteen-bit parity word, the method further comprising collapsing the sixteen-bit parity word into a 4-bit DIP4 parity word.

10 12. The method of claim 11, wherein the adjustment of the intermediate DIP parity word comprises shifting the bits of the 4-bit DIP4 parity word to the left one bit for each word that was assigned values of logical zeroes.

13. The method of claim 11, wherein the packet is a SPI4-2 received packet,  
15 the method further comprising:

before propagating the diagonal XOR calculation chains through the sample of words containing the control word:

storing the least four significant bits of the control word; and

assigning the least four significant bits of the control word to logical ones.

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14. The method of claim 13, further comprising:

comparing the stored four bits of the control word to the DIP4 parity word to determine whether the packet was received correctly.

15. The method of claim 11, wherein the packet is a SPI4-2 received packet, the method further comprising:

forming the logical AND product of the bits in the DIP4 parity word to determine whether the packet was received correctly.

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16. The method of claim 11, wherein the packet is to be a SPI4-2 transmitted packet, the method further comprising:

replacing the least four significant bits of the control word with the DIP4 parity word; and

10 transmitting the data words and the control word in the packet.

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